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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/963,419	09/27/2001	Michio Ono	Q66438	8980

7590

07/22/2003

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EXAMINER
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MUTSCHLER, BRIAN L

ART UNIT	PAPER NUMBER
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1753

13

DATE MAILED: 07/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/963,419

Applicant(s)

ONO, MICHIO

Examiner

Brian L. Mutschler

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 3-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 5-17 is/are rejected.
- 7) ☒ Claim(s) 3 and 4 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 13, 2003 has been entered.

### ***Comments***

1. The rejection of claims 6 and 7 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's amendment.
2. The rejection of claims 1-17 under 35 U.S.C. 103 over Miyasaka has been overcome by Applicant's amendment. As noted in Applicant's response, the device of Miyasaka uses a dye that operates as a proton pump, as opposed to a hole/electron generating device as recited in amended claim 1.

### ***Claim Objections***

3. Claim 1 is objected to because of the following informalities:
  - a. In claim 1 at line 6, please change "adsorbing" to --absorbing--.Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/09603, herein referred to as WO '603.

WO '603 discloses a differential response light receiving device comprising two electrode layers **11** and **13** surrounding a photosensitive layer **12** (fig. 1; p. 11, lines 22-30). A doped semiconductor wafer can function as both the substrate **14** and as the electrode **11** (p. 12, lines 19-26). The photosensitive layer **12** comprises a thin sheet of organic semiconducting material using a material such as poly-N-vinylcarbazole doped with a dye "to enhance the photosensitivity in visible spectral range" (p. 14, lines 13-14; p. 16, lines 18-22). The poly-N-vinylcarbazole functions as a hole/electron transport material (p. 16, lines 18-22). WO '603 also discloses that an additive, such as solid state electrolytes, can be added to the active layer **12** to modify and improve the device performance (p. 17, lines 8-27). The absence of a redox species is evidenced by the differential response of the devices, as illustrated by Figures 17 and 18.

Regarding claims 5-7, the device may be used for full-color detection by "splitting a sensor element (pixel) into three subpixels with response to red (600-700 nm), green (500-600 nm) and blue (400-500 nm) (R,G,B) spectral regions" (p. 20, lines 17-21). As shown in Figure 4, the red, green and blue detection regions are arranged in order of

increasing wavelength. Furthermore, WO '603 discloses that the light can enter from either the substrate side of the device or the side opposite the substrate (figures 1 and 2).

The device of WO '603 differs from the instant invention because WO '603 does not disclose that the dye-sensitized semiconductor device utilizes the electrolyte, as recited in claim 1.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used an electrolyte with the dye-sensitized semiconductor layer in the device of WO '603 because using an electrolyte can improve the device performance (p. 17, lines 8-27).

6. Claims 8, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO '99/09603, as applied above to claims 1 and 5-7, and further in view of Inada et al. (U.S. Pat. No. 4,985,618).

WO '603 describes a differential response device having the limitations recited in claims 1 and 5-7 of the instant application, as explained above in section 5. WO '603 also discloses that the device is hybridizable with other optical or electronic devices (p. 22, lines 12-15).

The device described by WO '603 differs from the instant invention because WO '603 does not disclose a composite light-receiving device comprised of a differential response and a stationary response device, as recited in claim 8, or an image sensor

comprising a plurality of pixels each comprised of the composite light-receiving device, as recited in claims 16 and 17.

Inada et al. disclose an image sensor comprising plurality of pixels (array) containing a differential response device and stationary response device (fig. 8(C); col. 1, line 57 to col. 2, line 21). The system is used to provide motion-detection capability using the differential response signal to detect edges (col. 2, lines 10-21).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device of WO '603 to use the differential response device with a stationary response device in a composite light-receiving device or an image sensor as taught by Inada et al. because using a differential response device and a stationary response device allows for motion-detection capabilities and image-sensing capabilities in a unitary device.

7. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO '99/09603 and Inada et al. (U.S. Pat. No. 4,985,618), as applied above to claims 8, 16 and 17, and further in view of Ohmori (U.S. Pat. No. 6,300,559).

WO '603 and Inada et al. describe a device having the limitations recited in claims 8, 16 and 17 of the instant invention, as explained above in section 6.

The device described by WO '603 and Inada et al. differs from the instant invention because they do not disclose a dye-sensitized stationary response device having the structural limitations recited in claims 10-12.

Regarding claims 10-12, Ohmori discloses a dye-sensitized stationary response light-sensitized device having a semiconductor electrode comprised of a transparent electrode **2** and a photosensitive layer comprising a semiconductor **3** sensitized by a dye **4**, an electrolyte layer **5** containing a redox species, and a counter electrode **6** (fig. 1; col. 1, lines 26-37; col. 4, lines 17-24). Both the transparent electrode **2** and semiconductor **3** are made of chalcogenides (col. 2, lines 57-64). The dye-sensitized device has an "enhanced photoelectric conversion" (col. 2, lines 7-10).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the stationary response device in the device described by WO '603 and Inada et al. to use a dye-sensitized stationary response device as taught by Ohmori because the dye-sensitized stationary response device of Ohmori has an enhanced photoelectric conversion.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/09603 and Inada et al. (U.S. Pat. No. 4,985,618), as applied above to claims 8, 16 and 17, and further in view of Yu (U.S. Pat. No. 6,300,612).

WO '603 and Inada et al. describe a device having the limitations recited in claims 8, 16 and 17, as explained above in section 6.

The device described by WO '603 and Inada et al. differs from the instant invention because they do not disclose a composite light-receiving device wherein the differential response device and stationary response device are stacked, as recited in claim 9.

Yu discloses an image sensor made from dye-sensitized semiconductors and electrolytes (col. 10, lines 18-65). A plurality of semiconductor electrodes are used in a stack configuration, with a blue-sensitive electrode, a green-sensitive electrode and a red-sensitive electrode stacked in that order from the light incident side of the electrode (fig. 3A and 3B). The use of a plurality of wavelength-sensitive electrodes allows the device to be responsive to the full-color spectrum, and the stacked array allows the sensing area of each wavelength-sensitive electrode to the total pixel size without absorbing the responsive wavelengths of the other layers (col. 14, lines 8-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the differential response device and the stationary response device in the composite light-receiving device described by WO '603 and Inada et al. to use stacked devices as taught by Yu because using stacked devices allows the sensing area of each electrode to be exposed over the entire pixel size.

9. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 99/09603, Inada et al. (U.S. Pat. No. 4,985,618) and Ohmori (U.S. Pat. No. 6,300,559), as applied above to claims 10-12, and further in view of Yu (U.S. Pat. No. 6,300,612).

WO '603, Inada et al., and Ohmori describe a device having the limitations recited in claims 10-12 of the instant invention, as explained above in section 7.

The device described by WO '603, Inada et al., and Ohmori differs from the instant invention because they do not disclose the following:



- a. A plurality of semiconductor electrodes in the stationary response device sensitive to different wavelengths, as recited in claim 13;
- b. The plurality of semiconductor electrodes arranged in order of increasing wavelength sensitivity from the light-incident side of the device, as recited in claim 14; and
- c. The plurality of semiconductor electrodes comprising a blue-sensitive electrode, a green-sensitive electrode and a red-sensitive electrode, in that order from the light-incident side, as recited in claim 15.

Yu discloses an image sensor made from dye-sensitized semiconductors and electrolytes (col. 10, lines 18-65). A plurality of semiconductor electrodes are used in a stack configuration, with a blue-sensitive electrode, a green-sensitive electrode and a red-sensitive electrode stacked in that order from the light incident side of the electrode (fig. 3A and 3B). The use of a plurality of wavelength-sensitive electrodes allows the device to be responsive to the full-color spectrum, and the stacked array allows the sensing area of each wavelength-sensitive electrode to the total pixel size without absorbing the responsive wavelengths of the other layers (col. 14, lines 8-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the semiconductor electrode in the device described by WO '603, Inada et al., and Ohmori to use a plurality of wavelength-sensitive electrodes including blue-, green-, and red-sensitive electrodes, as taught by Yu, because a plurality of electrodes allows the device to be responsive to the full-color spectrum.

***Response to Arguments***

10. Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection.

11. With regard to Miyasaka, Applicant had noted the difference between the photosensitive layer of Miyasaka and the "semiconductor fine particles 21 sensitized by dyes 22" (see page 8 of Applicant's response). It is noted that this difference has not been claimed by the Applicant's.

***Allowable Subject Matter***

12. Claims 3 and 4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter: Claims 3 and 4 are distinguished over the prior art of record because they provide a differential response, dye-sensitized device, wherein the dye generates electrons and holes, comprising a metal chalcogenide semiconductor. In the differential response device of WO '603, the active layer 12 comprises a poly-N-vinylcarbazole semiconductor sensitized by a dye.


**Conclusion**

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

blm  
June 27, 2003

  
NAM NGUYEN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700